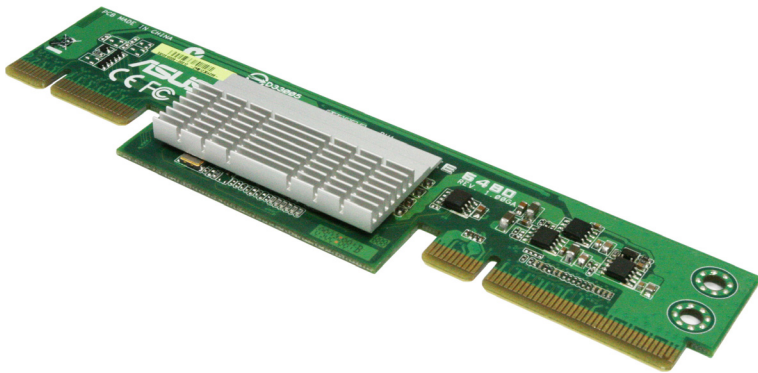




# PIKE 6480

## *SAS RAID card*



E4380

First Edition

February 2009

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# Notices

## Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



---

The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

---

## Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

**This class B digital apparatus complies with Canadian ICES-003.**



---

**DO NOT** throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

---



---

**DO NOT** throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

---

# Safety information

## Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the server.
- When adding or removing devices to or from the server, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing server before you add a device.
- Before connecting or removing signal cables from the server, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Ensure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

## Operation safety

- Before installing any component to the server, carefully read all the manuals that came with the package.
- Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

## About this guide

This user guide contains the information you need when installing and configuring the server management board.

### How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**  
This chapter offers the ASUS PIKE 6480 SAS RAID card features and the new technologies it supports.
- **Chapter 2: RAID configuration**  
This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.
- **Chapter 3: Driver installation**  
This chapter provides instructions for installing the RAID drivers on different operating systems.

### Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**  
The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.
2. **Optional documentation**  
Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

## Conventions used in this guide

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



**DANGER/WARNING:** Information to prevent injury to yourself when trying to complete a task.



**CAUTION:** Information to prevent damage to the components when trying to complete a task.



**IMPORTANT:** Instructions that you **MUST** follow to complete a task.



**NOTE:** Tips and additional information to help you complete a task.

## Typography

### **Bold text**

Indicates a menu or an item to select.

### *Italics*

Used to emphasize a word or a phrase.

### <Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

### <Key1+Key2+Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

Example: <Ctrl+M>

### **Command**

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At the DOS prompt, type the command line:  
**format a:**

## PIKE 6480 specifications summary

Chipset	Marvell 88SE6480
Interface	ASUS PIKE interface
Ports	8 ports
RAID levels	RAID 0 / RAID1 / RAID10 / RAID5
Devices supported	SAS / SATA II / SATA devices
Data transfer rate	SATA 1.5 Gb/s per PHY SATA II and SAS 3.0 Gb/s per PHY
Form factor	6.44 in x 1.57 in (1U compatible)

\* Specifications are subject to change without notice.



This chapter offers the ASUS PIKE 6480  
SAS RAID card features and the new  
technologies it supports.

# **1** **Product introduction**

## 1.1 Welcome!

Thank you for buying an ASUS® PIKE 6480 SAS RAID card!

The ASUS PIKE 6480 allows you to create RAID 0, RAID 1, RAID 10, and RAID 5 set(s) from SAS hard disk drives connected to the SAS connectors on the motherboard

Before you start installing the SAS RAID card, check the items in your package with the list below.

## 1.2 Package contents

Check your package for the following items.

- ASUS PIKE 6480 SAS RAID card
- Support CD
- User guide



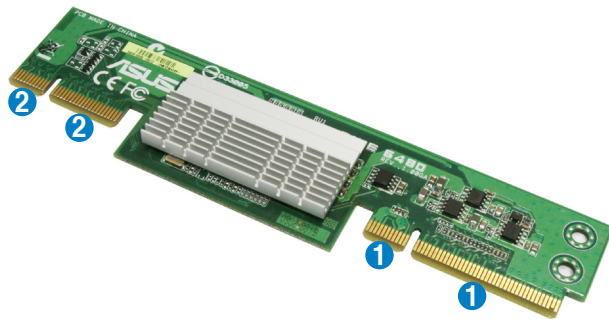
---

If any of the above items is damaged or missing, contact your retailer.

---

## 1.3 Card layout

The illustration below shows the major components of the SAS RAID card.



1. ASUS PIKE interface-1: PCI-E x4
2. ASUS PIKE interface-2: 8-port SAS signal with SGPIO interface\*



\* The SGPIO interface is used for visibility into drive activity, failure and reboot status, so that users could build high-performance and reliable storage systems. Refer to the motherboard manual for detailed information about using the SGPIO connectors on the motherboard.

## 1.4 System requirements

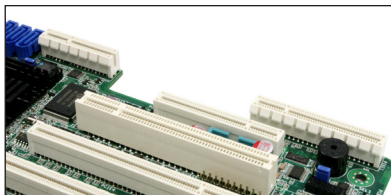
Before you install the PIKE 6480 SAS RAID card, check if your system meets the following requirements:

- **Workstation or server motherboard with a PIKE RAID card slot**
- **SAS or SATA hard disk drives and cables**
- **Supporting operating system:**  
Windows® and Linux operating systems (refer to website for details)
- **Other requirement:**
  - Appropriate thermal solution
  - Certified power supply module

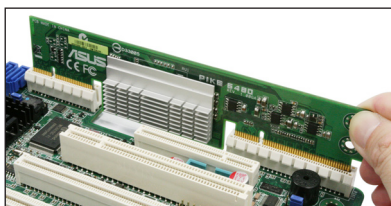
## 1.5 Card installation

Follow below instructions to install the RAID card on your motherboard.

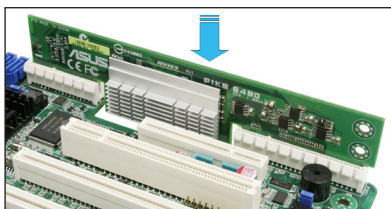
1. Locate the PIKE RAID card slot on the motherboard.



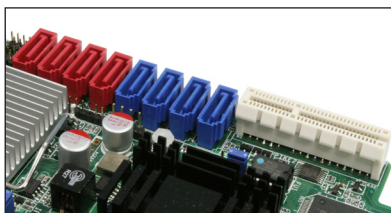
2. Align the golden fingers of the RAID card with the PIKE RAID card slot.



3. Insert the RAID card into the PIKE RAID card slot. Ensure it's completely inserted into the PIKE RAID card slot.



Connect the SAS hard disk drives to SAS connectors 1-4 (red) on the motherboard when using four ports. The SAS connectors 5-8 (blue) function when using eight ports.



This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.

# 2 RAID configuration

## 2.1 Setting up RAID

The RAID card supports RAID 0, RAID 1, RAID 5, and RAID 10 set(s).

### 2.1.1 RAID definitions

**RAID 0 (Data striping)** optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

**RAID 1 (Data mirroring)** copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

**RAID 5** stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

**RAID 10** is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10\* configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.



---

If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support CD to a floppy disk before you install an operating system to the selected hard disk drive.

---

### 2.1.2 Installing hard disk drives

The RAID card supports SAS hard disk drives for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install SAS hard disk drives for RAID configuration

1. Install the SAS drives into the drive bays following the instructions in the system user guide.
2. Connect a SAS signal cable to the signal connector at the SAS backplane or on the back of the SAS drive.
3. Connect a power cable to the power connector at the SAS backplane or on the back of the SAS drive.

## 2.2 Marvell® 88SE6480 SAS RAID BIOS setup utility

The Marvell® 88SE6480 SAS RAID BIOS setup utility allows you to create RAID 0, 1, 10, and 5 set(s) from SAS hard disk drives that are connected to the PIKE 6480 SAS RAID card.



- DO NOT combine Serial ATA and SAS disk drives in one volume.
- The RAID setup screens shown in this section are for reference only and may not exactly match the items on your screen due to the controller version difference.

To enter the Marvell® RAID BIOS setup utility:

1. Turn on the system after installing all SAS hard disk drives.
2. During POST, press <Ctrl> + <M> to enter the utility main menu.

```
Marvell BIOS Setup (c) 2008 Marvell Technology Group Ltd.
[Selection] [Controller] [ Devices ] [ RAID ]
Adapter 0

VendorID:DeviceID:      11AB:6480
BIOS Version:           3.1.0.18
PCI Slot:               00
Adapter Serial Number:  VA2400WXX0000000005
IRQ Number:             0E
Raid Mode:              RAID0 RAID1 RAID10 RAID5
Port 0 SAS Address:     5005043011AB0028
Port 1 SAS Address:     5005043011AB0029
Port 2 SAS Address:     5005043011AB002A
Port 3 SAS Address:     5005043011AB002B
Port 4 SAS Address:     5005043011AB002C
Port 5 SAS Address:     5005043011AB002D
Port 6 SAS Address:     5005043011AB002E
Port 7 SAS Address:     5005043011AB002F

ENTER/SPACE:Select, ESC:Back/Exit
```

4. Press <Enter> and select a desired adapter for RAID configuration.

```
Marvell BIOS Setup (c) 2008 Marvell Technology Group Ltd.
[Selection] [Controller] [ Devices ] [ RAID ]
Select Adapter
Adapter 0

ENTER/SPACE:Select, ESC:Back/Exit
```

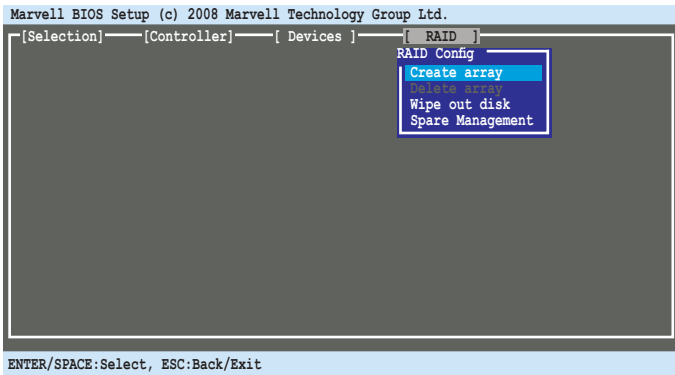


The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

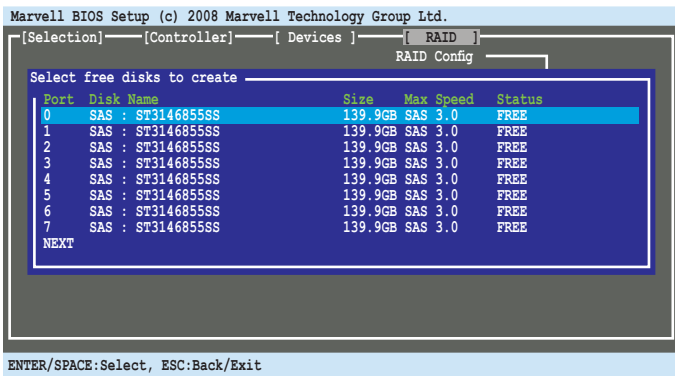
## 2.2.1 Creating an array

To create a RAID set:

1. From the utility menu bar, select **RAID > Create array**.



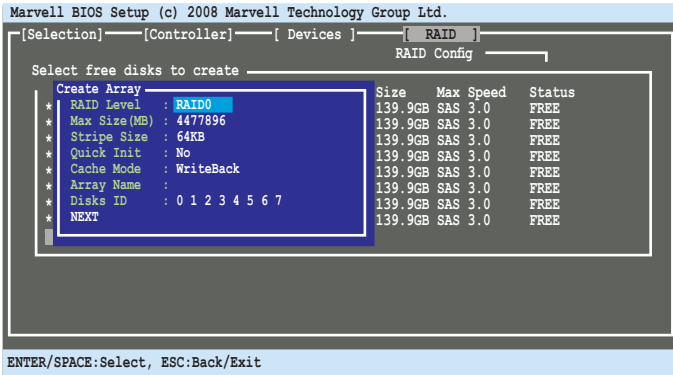
2. Press <Enter>. The screen shows the disks you can add to make up the RAID set. Use the arrow key to select a disk and press <Enter> or <Space> to include this disk in the array.



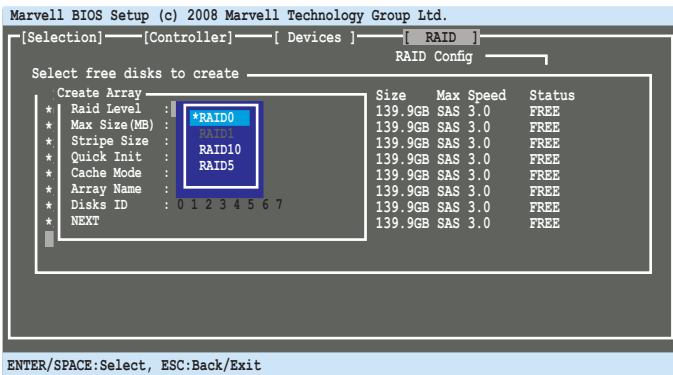
3. After you have selected the desired disks, select **NEXT** to create array.



4. The **Create Array** screen appears.

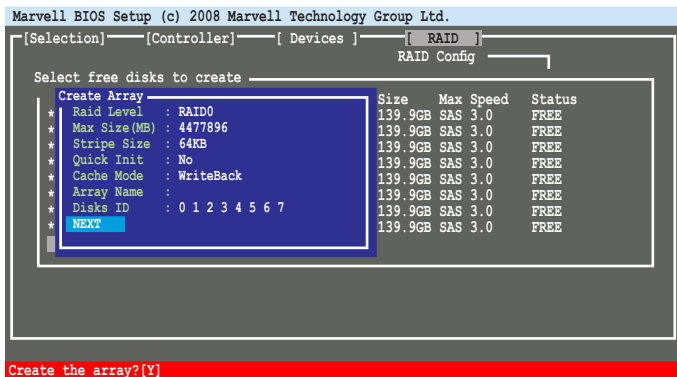


5. Use the arrow key to select the **RAID Level** item and press <Enter> to display the available RAID set. Select a RAID set and press <Enter>. After you have selected the desired RAID set, select **Next** to create array.

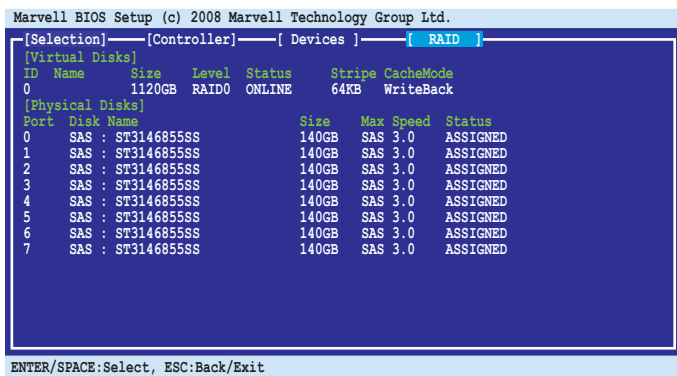


- The available RAID sets vary with the number of disks you select. The RAID sets that you are not allowed to create are grayed out.
- Except for the **RAID Level** item, we recommend you keep the default values for the other items in **Create Array** screen.

- A confirmation screen appears. Press <Y> to confirm the array creation.



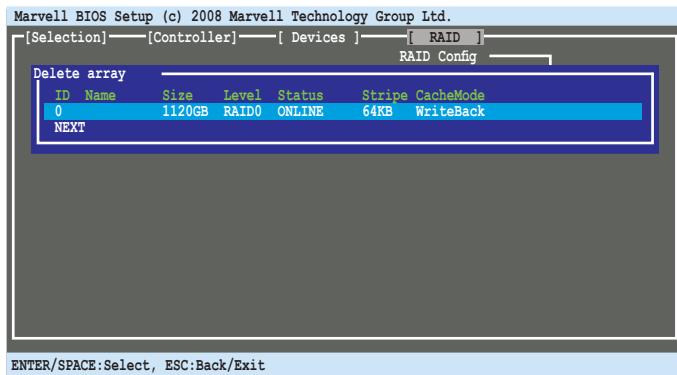
- The newly created array appears in the **RAID** menu.



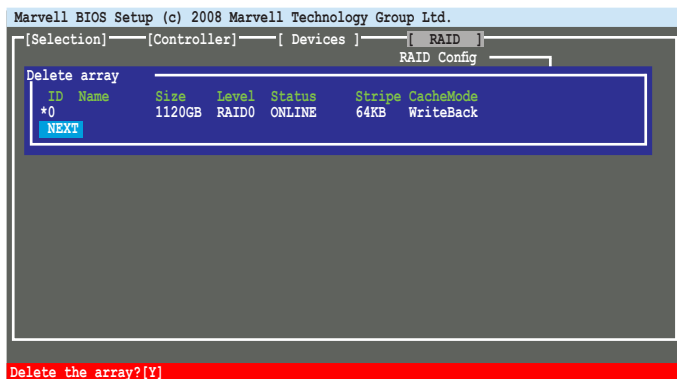
## 2.2.2 Deleting an array

To delete a RAID set:

1. From the utility menu bar, select **RAID > Delete array**, and then press **<Enter>**. The **Delete array** screen appears.



2. Select a desired array to delete, select **NEXT**, and then Press **<Enter>**. Press **<Y>** after the confirmation screen appears.



3. Press **<Y>** again to confirm and delete the selected array.

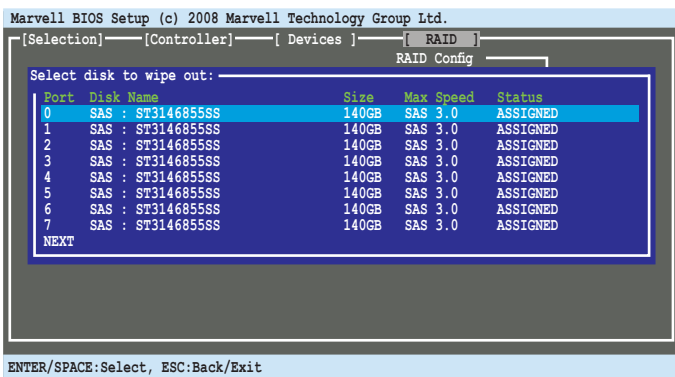


You cannot recover lost data if you delete an array. Ensure you back up important data before deleting an array.

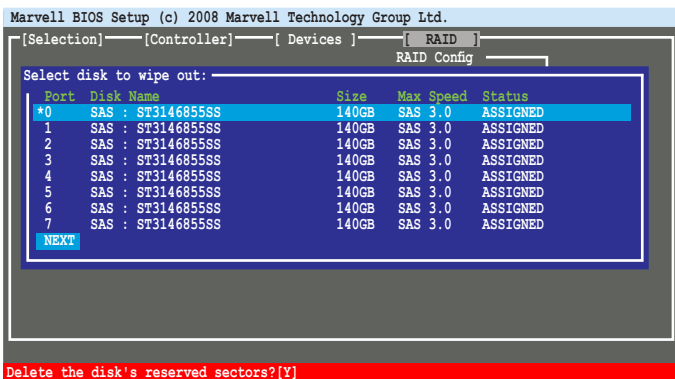
### 2.2.3 Wipe out disk

To erase the reserved sectors of the selected disk:

1. From the utility menu bar, select **RAID > Wipe out disk**, and then press <Enter>. The **Wipe out disk** screen appears.



2. Select a desired disk to erase the reserved sectors. Select **NEXT**, and then press <Enter>. Press <Y> after the confirmation screen appears.



3. Press <ESC> to exit the **Wipe out disk** screen.



You cannot recover lost data if you erase sectors of a disk. Ensure you back up important data before erasing sectors of a disk.

## 2.2.4 Spare Management

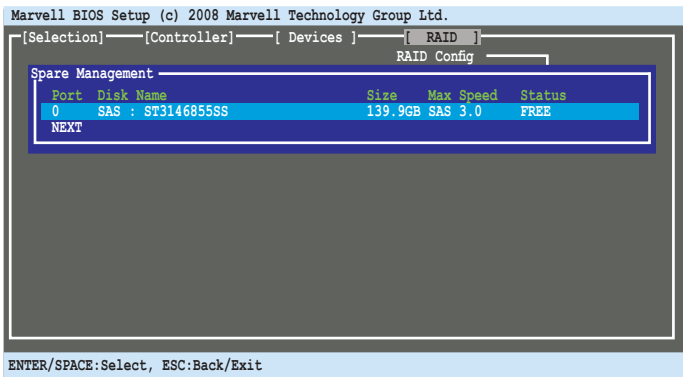
You may configure one disk as a global hot spare to protect critical data on RAID set(s). You may create the hot spare disk before or after you create a RAID set. Refer to this section when adding a hot spare disk on an existing volume.



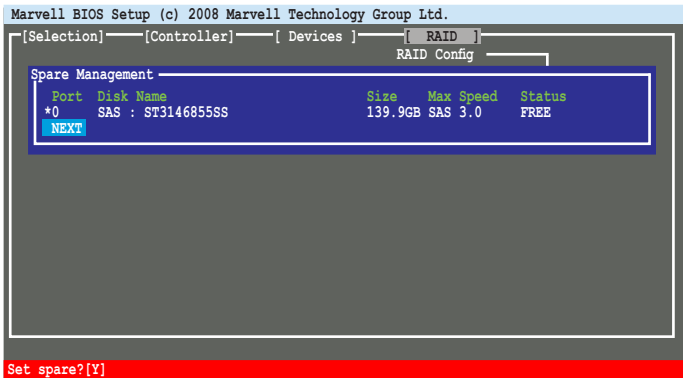
If a disk on a RAID set fails, the utility automatically rebuilds the failed disk data on the hot spare. When the failed disk is replaced, the utility assigns the replacement as the new hot spare.

To create a hot spare

1. From the utility menu bar, select **RAID > Spare Management**, and then press <Enter>. The **Spare Management** screen appears.



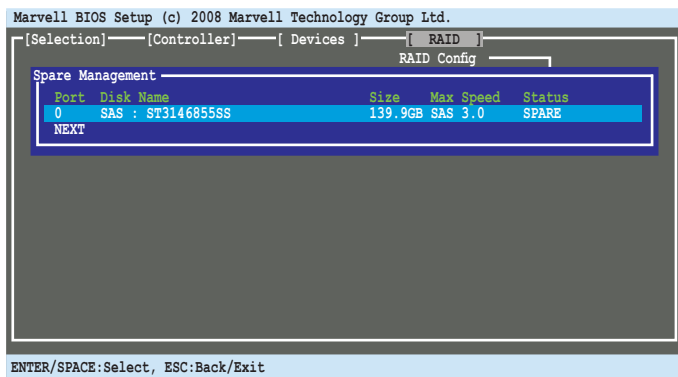
2. Select a desired drive to create a hot spare. Select **NEXT**, and then press <Enter>. Press <Y> after the confirmation screen appears.



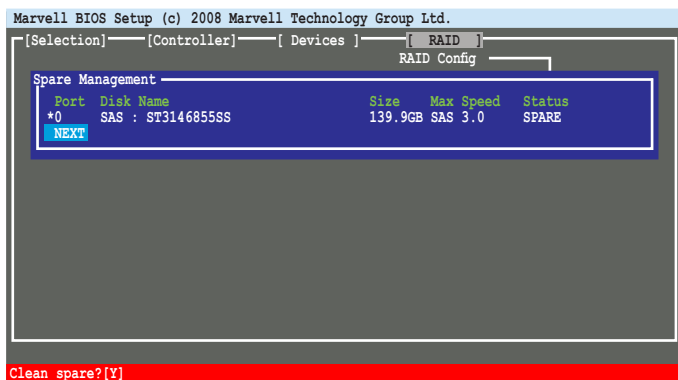
3. Press <ESC> to exit the **Spare Management** screen.

To clean a hot spare

1. From the utility menu bar, select **RAID > Spare Management**, and then press <Enter>. The **Spare Management** screen appears.



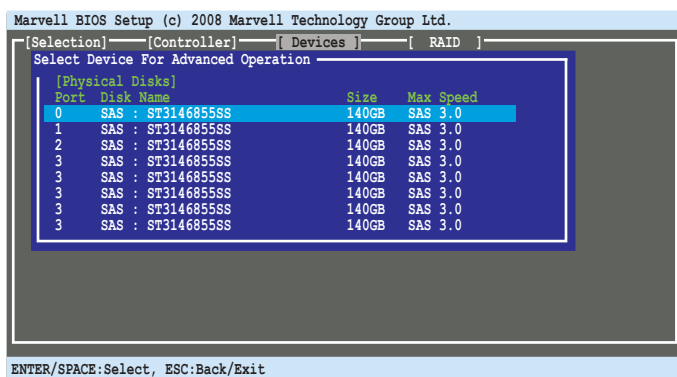
2. Select a desired drive to clean the hot spare. Select **NEXT**, and then press <Enter>. Press <Y> after the confirmation screen appears.



3. Press <ESC> to exit the **Spare Management** screen.

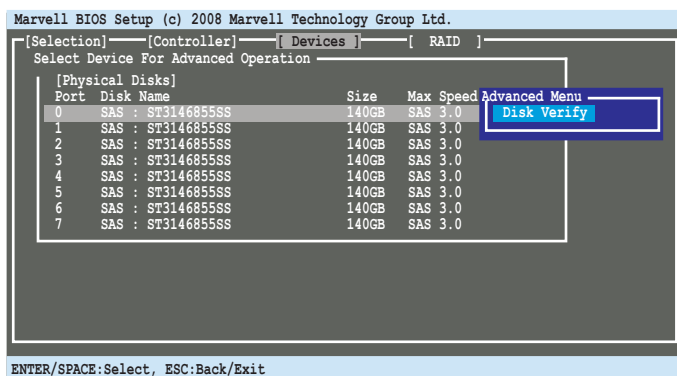
## 2.2.5 Advanced Operation

From the utility menu bar, select **Devices**, and then press <Enter>. The **Advanced Operation** screen appears. You can run **Disk Verify** and **Low Level Format** in the Advanced Operation screen.



To run Disk Verify

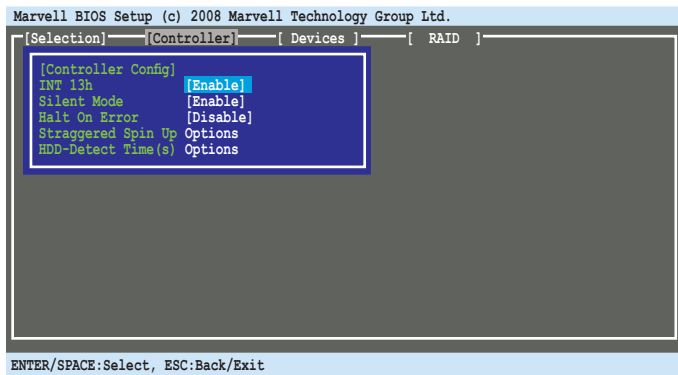
1. In the **Advanced Operation** screen, use the arrow key to select a disk and press <Enter> or <Space>. The **Advanced Menu** appears. Select **Disk Verify** and press <Enter>.



2. Press <Y> after the confirmation screen appears.
3. The utility verifies the selected disk. When completed, press <ESC> to return to the **Advanced Operation** screen.

## 2.2.6 Controller Configuration

From the utility menu bar, select **Controller**, and then press <Enter>. The **Controller Config** screen appears and allows you to change controller settings.



### INT 13h [Enable]

Allows you to enable or disable the Interrupt 13h support. Set this item to [Enable] if you want to use the device(s) connected to PIKE 6480 as boot device. Set this item to [Disable] if you want to use the device(s) connected to PIKE 6480 as data device. Configuration options: [Disable] [Enable]

### Silent Mode [Enable]

Allows you to enable or disable the BIOS POST silent mode. When enabled, the information of the drives connected to PIKE 6480 will be hidden during system POST. Configuration options: [Disable] [Enable]

### Halt On Error [Disable]

Allows you to enable or disable the Halt On Error function. When enabled, the BIOS POST will halt when an error (such as virtual drive status changes) occurs and require user's confirmation to continue. Configuration options: [Disable] [Enable]

### Staggered Spin UP

Allows you to select the number of ports per spin up group and the spin up delay time per second between groups.

Number of Devices Per Group

Configuration options: [1] [2] – [7] [8]

Group Spin Up Delay(s)

Configuration options: [0] [1] – [6] [7]

### HDD-Detect Time(s)

Configuration options: [0] [1] – [9] [10]



This chapter provides instructions for installing the RAID drivers on different operating systems.

# 3 Driver installation

## 3.1 RAID driver installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides instructions on how to install or update the RAID card drivers.



The RAID card driver might be included in the Linux OS installation CD, and could be loaded automatically during OS installation. However, we recommend using the RAID driver packaged in the RAID card support CD for better reliability.

### 3.1.1 Creating a RAID driver disk



You may have to use another system to create the RAID driver disk from the support CD.

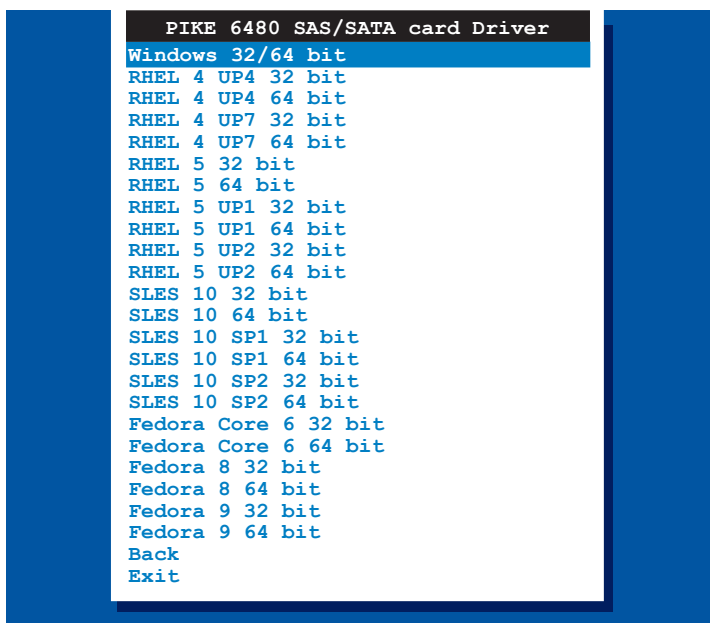
A floppy disk with the RAID driver is required when installing Windows® or Linux operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support CD).

To create a RAID driver disk in DOS environment:

1. Place the support CD in the optical drive.
2. Restart the computer, then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support CD. Save your changes, then exit the BIOS Setup.
4. Restart the computer.
5. The Make Disk menu appears. Select **PIKE 6480 SAS/SATA card Driver**, and press <Enter> to enter the sub-menu.



6. Use the arrow keys to select the type of RAID driver disk you want to create.



7. Place a blank, high-density floppy disk to the floppy disk drive.
8. Press <Enter>.
9. Follow screen instructions to create the driver disk.

### 3.1.2 Windows® OS

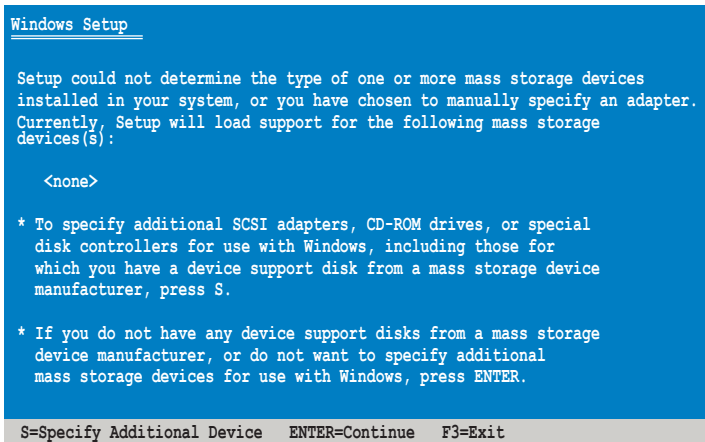
#### During Windows® OS installation

To install the RAID card driver when installing Windows® OS:

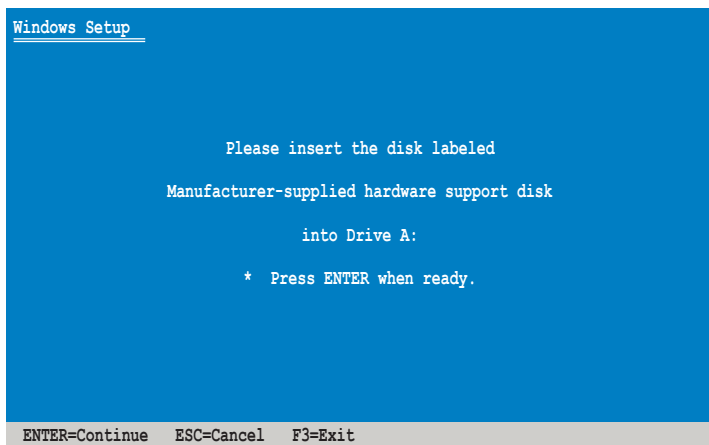
1. Boot the computer using the Windows® OS installation CD. The **Windows® Setup** starts.
2. Press <F6> when the message “Press F6 if you need to install a third party SCSI or RAID driver...” appears at the bottom of the screen.



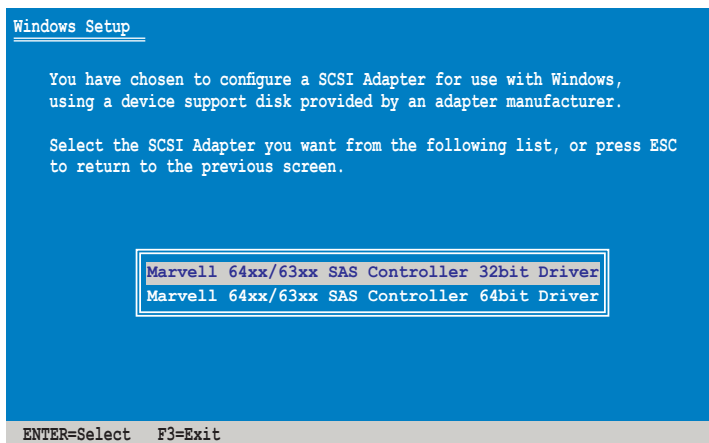
3. The next screen appears. Press <S> to specify an additional device.



4. Insert the RAID driver disk you created earlier to the floppy disk drive, then press <Enter>.



5. Select the RAID controller driver from the list, then press <Enter>.

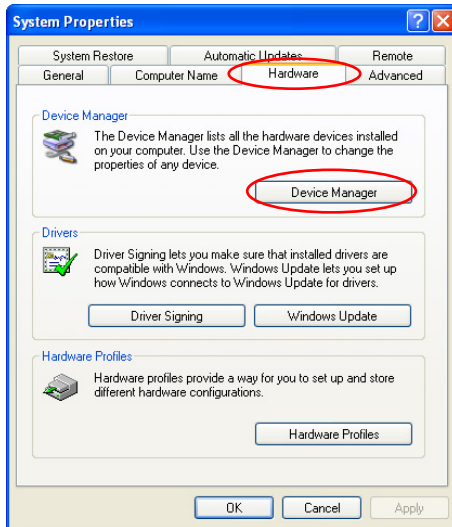


6. The Windows® Setup loads the RAID card drivers from the RAID driver disk. When next screen appears, press <Enter> to continue installation.
7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

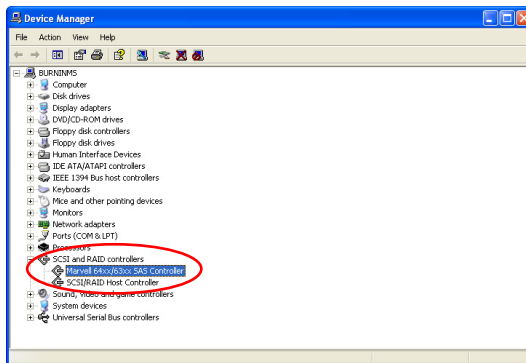
## After Windows® OS installation

To update the RAID card driver after installing Windows® OS:

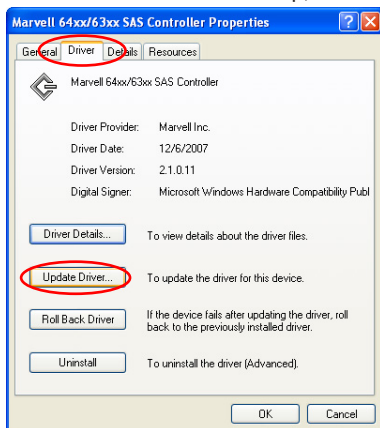
1. Right-click the **My Computer** icon on the desktop and select **Properties** from the menu.
2. Click the **Hardware** tab on the top, then click the **Device Manager** button.



3. Double-click the **Marvell 6480 SAS Controller**.



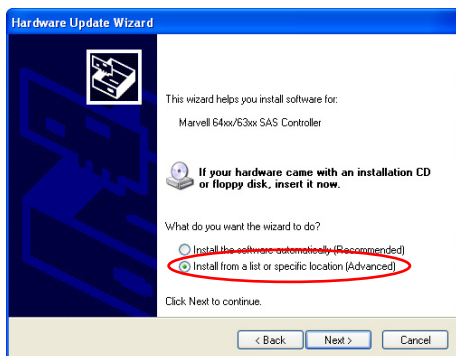
4. Click the **Driver** tab on the top, then click **Update Driver**.



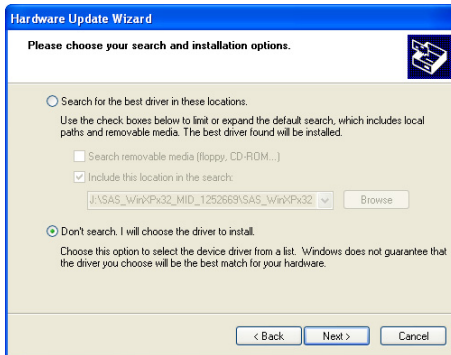
5. Toggle **No, not this time**, then click **Next** to continue.



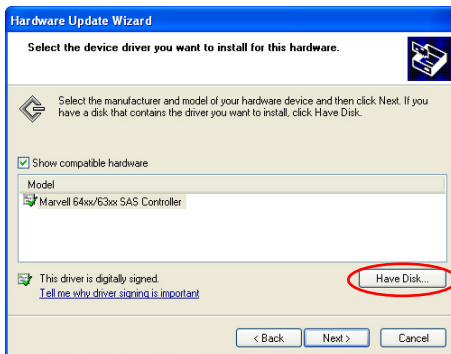
6. Toggle **Install from a list or specific location**, then click **Next** to continue.



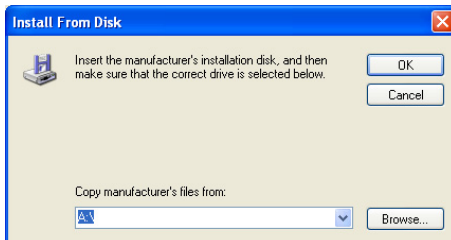
7. Toggle **Don't choose. I will choose the driver to install**, then click **Next** to continue.



8. Highlight **Marvell 6480 SAS Controller**, then click **Have Disk**.

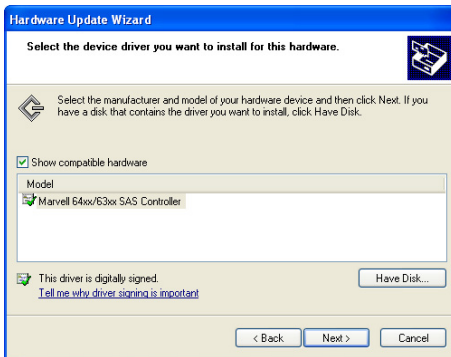


9. Select from the drop-down menu and locate the driver.

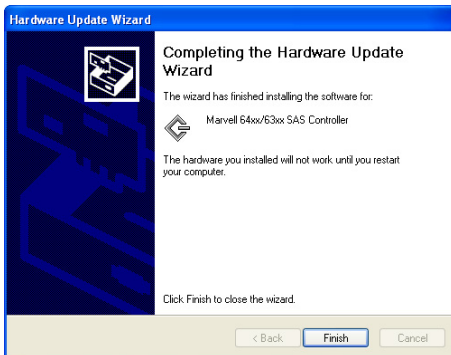




10. Click **Next** to start updating the driver.



11. After completing driver update, click **Finish** to close the wizard. It is recommended to restart the computer for the device to work properly.



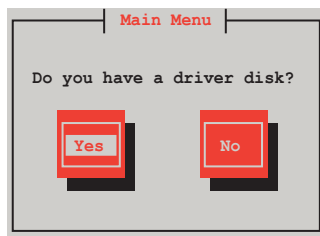
### 3.1.3 Red Hat® Enterprise Linux OS

To install the RAID card driver when installing Red Hat® Enterprise OS:

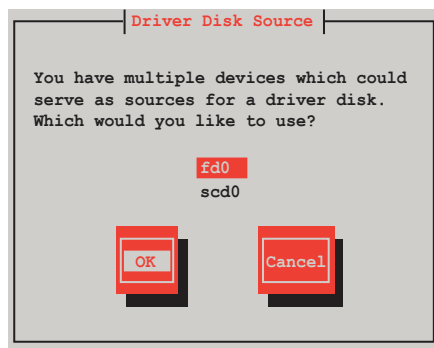
1. Boot the system from the Red Hat® OS installation CD.
2. At the `boot:`, type `linux dd`, then press <Enter>.

```
- To install or upgrade in graphical mode, press the <ENTER> key.
- To install or upgrade in text mode, type: linux text <ENTER>.
- Use the function keys listed below for more information.
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]
boot: linux dd
```

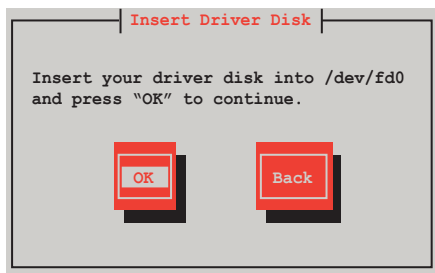
3. Select **Yes** using the <Tab> key when asked if you have the driver disk, then press <Enter>.



4. Select **fd0** using the <Tab> key when asked to select the driver disk source. Press <Tab> to move the cursor to **OK**, then press <Enter>.

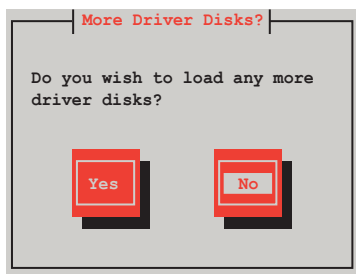


5. Insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select **OK**, then press <Enter>.



The drivers for the RAID card are installed to the system.

6. When asked if you will load additional RAID controller drivers, select **No**, then press <Enter>.

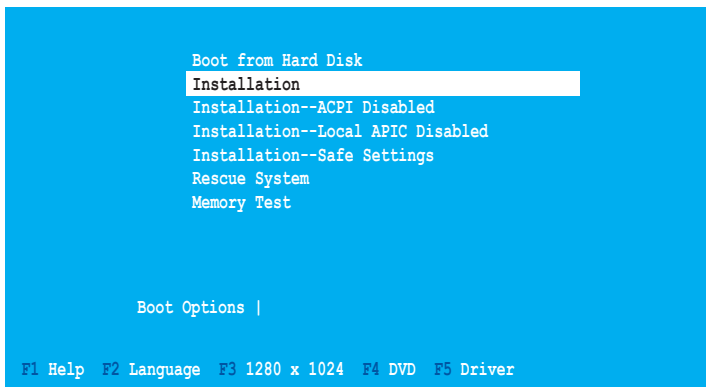


7. Follow the screen instructions to continue the OS installation.

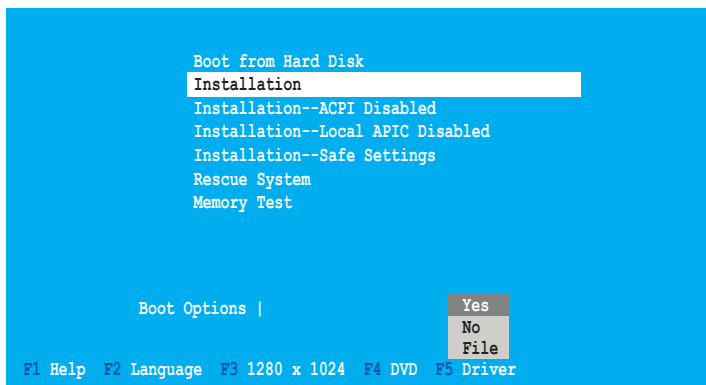
### 3.1.4 SUSE Linux Enterprise Server OS

To install the RAID card driver when installing SUSE Linux Enterprise Server OS:

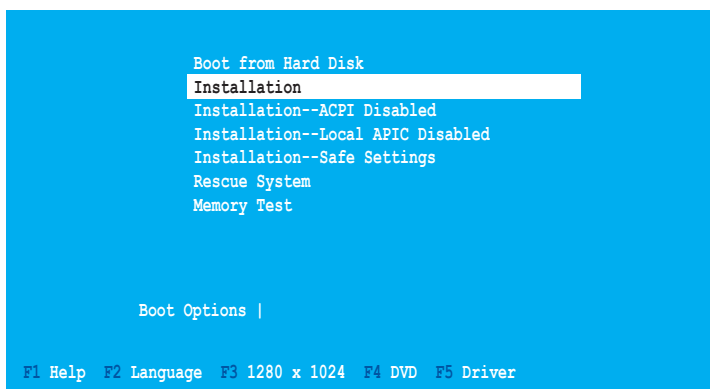
1. Boot the system from the SUSE OS installation CD.
2. Use the arrow keys to select **Installation** from the **Boot Options** menu.



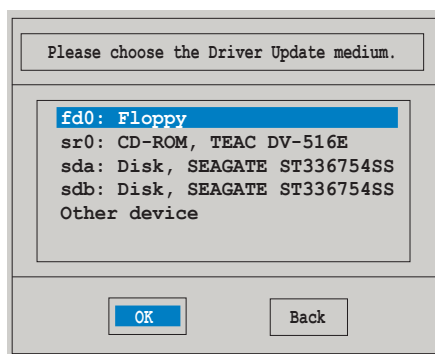
3. Press <F5>, then select **Yes** from the menu. Press <Enter>.



4. Insert the RAID driver disk to the floppy disk drive. Make sure that **Installation** from the **Boot Options** menu is selected, then press <Enter>.



5. When below screen appears, select the floppy disk drive (fd0) as the driver update medium. Select **OK**, then press <Enter>.



The drivers for the RAID controller are installed to the system.

## 3.2 Support CD information

The support CD that came with the SAS RAID card package contains the drivers that you can install to avail all product features.



The contents of the support CD are subject to change at any time without notice. Visit the ASUS website ([www.asus.com](http://www.asus.com)) for updates.

### 3.2.1 Running the support CD

Place the support CD to the optical drive. The CD automatically displays the Drivers menu if Autorun is enabled in your computer.



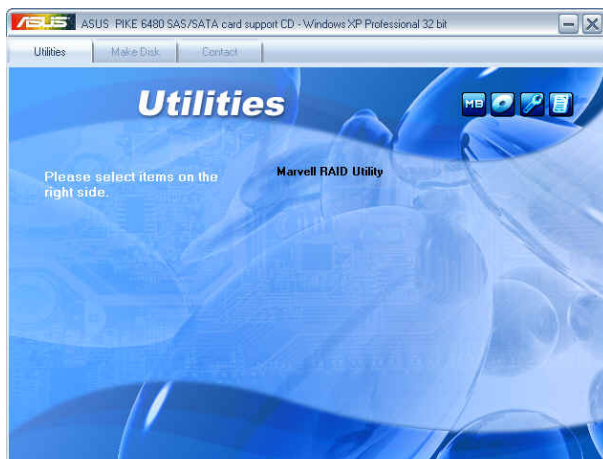
- You have to install the PIKE 6480 SAS RAID card on your motherboard BEFORE you can launch the Autorun function of the support CD.
- If Autorun is NOT enabled in your computer, browse the contents of the support CD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the CD.

### 3.2.2 Utilities menu

The Utilities menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to activate the devices.

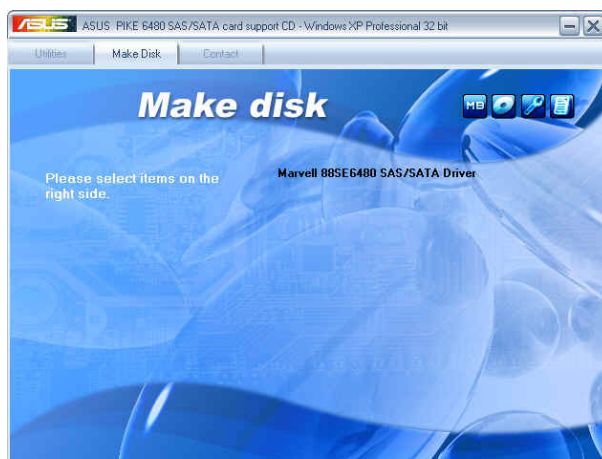


The screen display and driver options may vary under different operating system versions.



### 3.2.3 Make disk

The Make disk menu contains items to create the Marvell® RAID driver disk.



### 3.2.4 Contact information

Click the Contact tab to display the ASUS contact information. You can also find this information on the inside front cover of this user guide.

